MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

MASTER OF CS (SOFTWARE ENGINEERING AND SOFTWARE ARCHITECTURE)
TRIMESTER 1521

TLD7011 – LOW LEVEL DESIGN OF SOFTWARE

(All sections / Groups)

22 JANUARY 2016
8.00 p.m - 10.00 p.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 5 pages, inclusive of the cover.
2. **Answer all questions.** There are **FOUR questions in total**
3. Please print all your answers in the Answer Booklet provided.

YOU MUST ANSWER EVERY QUESTION. EACH QUESTION CARRIES THE SAME DISTRIBUTION OF MARKS.

QUESTION 1

Evaluate task dependency diagrams shown in Figure 1 below and answer the following questions. Assume that each node is of unit weight.

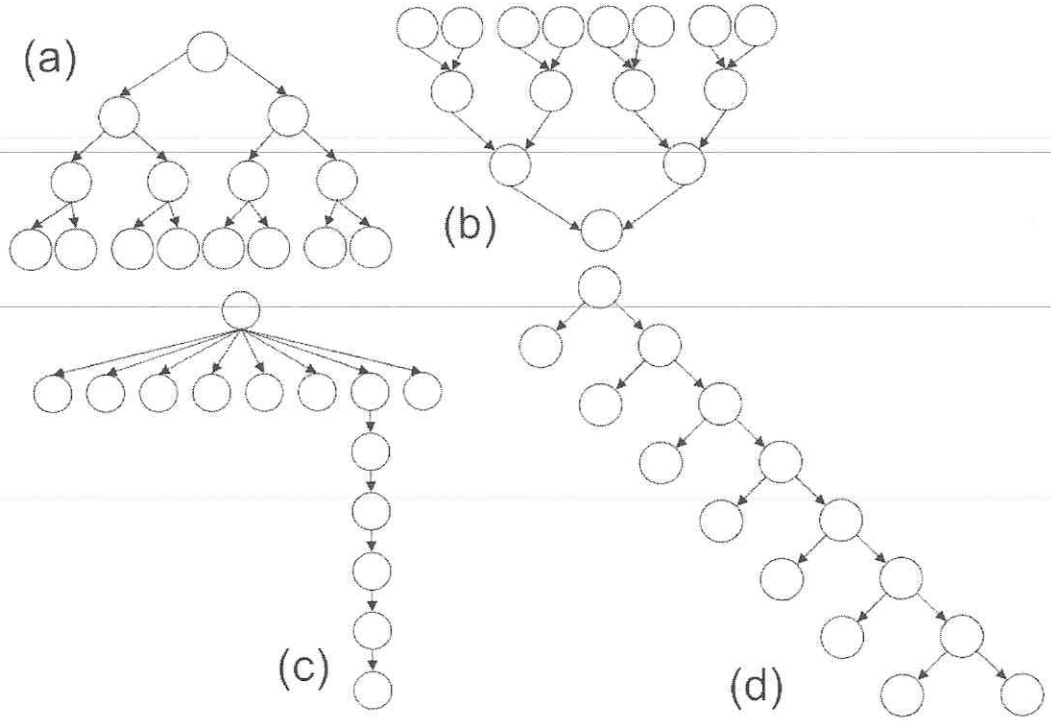

Figure 1: A collection of four task dependency diagram

A. Give the maximum degree of concurrency for each graph. **(4 MARKS)**

B. Give the critical path length for each graph. **(4 MARKS)**

C. Name one constraint that can impact the speedup of these graphs if they were to be implemented in a parallel manner? **(2 MARKS)**

Continued...

QUESTION 2

Software design patterns are used in the design of many software systems, however, to explain a software design pattern to a customer who is not well versed with software application development and object oriented design can be a challenging task.

A. Explain the following software design pattern using a non-software example. To scope your explanation, you are required to provide a *non-software* example in a stipulated domain. Your answer may include figures to aid your explanation. **(6 MARKS)**

I. Abstract Factory, in an industrial manufacturing domain

II. Singleton, in a political setting whereby there is only one leader at a time.

III. Adapter, in a tools setting.

B. Draw a class diagram that shows how the Strategy design pattern can be used to implement a shopping cart payment system which accepts two payment strategies, either using a Credit Card or using Pay Pal. In your class diagram, show the implementation of the design pattern using an interface. **(4 MARKS)**

QUESTION 3

A. State common steps that can be found when you move a Method.

(4 MARKS)

B. For each of the following pieces of codes, re-factor using the given method. State the motivation to use the particular refactoring technique, and any special considerations that needs to be addressed.

(6 MARKS)

I. Encapsulate Field

```
1: public class MyClass
2: {
3:     public string LastName;
4:     public string FirstName;
5:     public int Age;
6: }
```

Continued...

II. Extract Hierachy

```
1: public class Dog
2: {
3:     public void EatFood()
4:     {
5:         // eat some food
6:     }
7:
8:     public void Groom()
9:     {
10:        // perform grooming
11:    }
12: }
```

III. Extract Method

```
1: public class Receipt
2: {
3:     private IList<decimal> Discounts { get; set; }
4:     private IList<decimal> ItemTotals { get; set; }
5:
6:     public decimal CalculateGrandTotal()
7:     {
8:         decimal subTotal = 0m;
9:         foreach (decimal itemTotal in ItemTotals)
10:            subTotal += itemTotal;
11:
12:        if (Discounts.Count > 0)
13:        {
14:            foreach (decimal discount in Discounts)
15:                subTotal -= discount;
16:        }
17:
18:        decimal tax = subTotal * 0.065m;
19:
20:        subTotal += tax;
21:
22:        return subTotal;
23:    }
24: }
```

Continued...

QUESTION 4

Code tuning is an important skill that a software developer and designer should know. Answer the following questions related to code tuning

A. Give examples (pseudocode is permissible) to demonstrate the following code tuning techniques. In your example, show the pre-turned code and the code after it has been tuned. **(6 MARKS)**

I. Busiest Loop on Inside

II. Unswitching

III. Unrolling

B. In your opinion what is the **drawback** of code tuning? Suggest one way of countering this drawback **(4 MARKS)**

END of Paper